

FAC-300 Series Instruction Manual



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【Instructions before use】

- ❄ Please read this manual carefully and understand it before use.
- ❄ Our company reserves the right not to be held responsible for losses or personal injuries caused by failure to follow the user manual.
- ❄ Please keep this manual properly for subsequent installation, maintenance, and troubleshooting.
- ❄ Please carefully read all contents marked with [Warning] and [Caution] during use.

【Warning】

- ✔ This product is suitable for use in flammable and explosive gases but not in flammable and explosive environments.
- ✔ Use of dangerous gases: Take precautions when this product is used with dangerous gases.
- ✔ Make sure the gas used does not react chemically with the sealing material.
- ✔ Gas pipeline leakage check: During the installation of this product, please check all gas pipeline connections to ensure there is no gas leakage.
- ✔ Do not use pressure exceeding the maximum working pressure of this product (maximum working pressure reference manual).
- ✔ It is strictly prohibited to open the product shell, replace parts, or modify the product.
- ✔ The working environment temperature of this product is 0~50°C.
- ✔ This product is not suitable for liquid media.

【Caution】

- ★ This product can be used once it is powered on. For accuracy, please allow the product to preheat for 15 to 30 minutes after powering on before use.
- ★ The product utilizes pressure and pressure differences to ensure consistency with the product specifications.
- ★ The direction of airflow is consistent with the arrow mark.
- ★ Use the signal type to ensure consistency with the product signal type.
- ★ The gas used is different from the calibration gas: confirm that the gas used does not react with the sealing material of this product and needs to be converted through the conversion coefficient and formula in the appendix of the manual.

1、 Product Introduction

Gas mass flow controllers (MFC) and mass flow meters (MFM) are used to precisely control and measure the mass flow of gases. Gas mass flow measurement and control are independent of temperature or pressure.

Gas mass flow controllers (MFC) and mass flow meters (MFM) have important applications in scientific research and production in various fields such as semiconductor and integrated circuit technology, special materials disciplines, chemical industry, petroleum industry, medicine, environmental protection, and vacuum. Its typical applications include coating equipment, microelectronic process equipment, such as diffusion furnaces, oxidation furnaces, epitaxial furnaces, CVD, plasma etching machines, sputtering tables, ion implanters, etc.; optical fiber melting, micro-reactors, gas mixing Gas distribution systems, biological fermentation systems, petrochemical equipment, gas chromatograph, and other analytical instruments.

2、 Product Principle

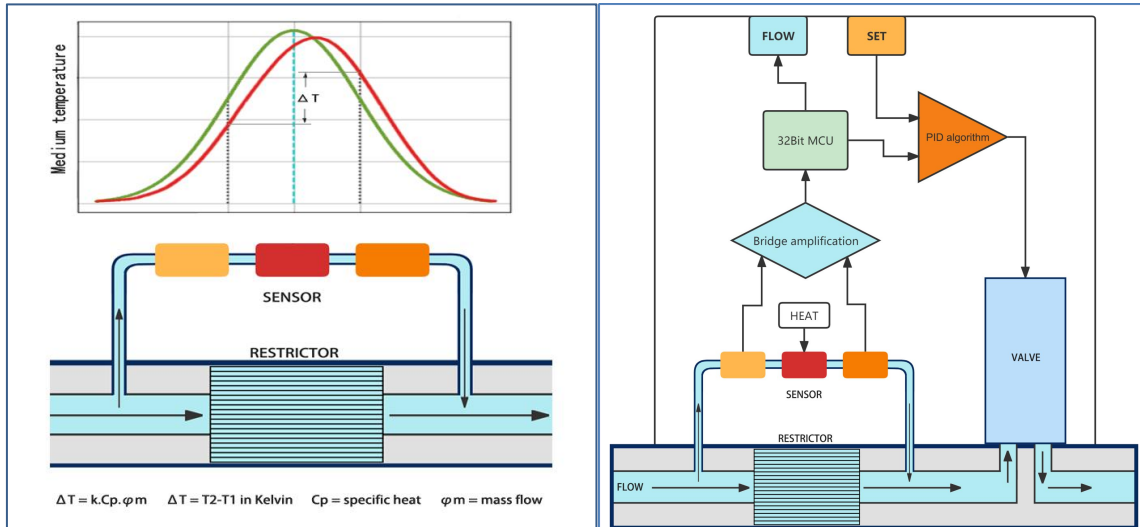


Figure 1. Sensor schematic diagram

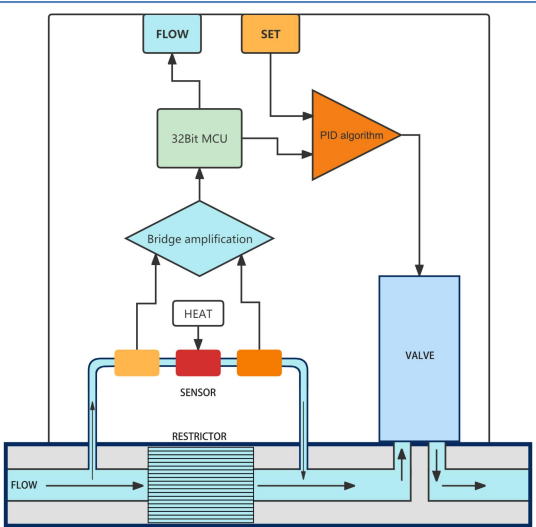


Figure 2. Schematic diagram of MFC structure

The core sensor of the thermal mass flow meter (MFM) is the capillary thermal temperature difference principle, which is composed of a stainless steel capillary tube with a thermal sensor and a heating element. A part of the gas flows through the bypass sensor and is heated by the heating element. The gas flow causes an asymmetric temperature distribution so that the temperature difference between the two thermal elements can be measured. This temperature difference is proportional to the mass flow rate through the sensor. The main flow channel is perfectly diverted by the laminar flow element so that the output of the sensor is linearly related to the total mass flow rate.

The thermal mass flow controller (MFC) amplifies the output signal of the sensor compares it with the user-set signal, and controls the opening of the solenoid valve through the PID algorithm to adjust the flow rate to achieve closed-loop control of the mass flow rate.

3、 Product Features

- ▲ FAC-300 series adopts a capillary thermal temperature difference sensor, which has high measurement accuracy, is not affected by temperature and pressure, and can be installed and used at any angle.

- ▲ The sensor and valve body of the FAC-300 series are made of 316L stainless steel, suitable for toxic and corrosive gases, and the maximum working pressure can reach 750 Psi.
- ▲ FAC-300 analog measurement control circuit, analog signal 0~5V or 4~20mA.
- ▲ The FAC-300 has a proportional solenoid control valve with high-speed and smooth control characteristics.
- ▲ FAC-300 series has passed CE and Rohs certification.

4、Specifications

4.1、Flow range and maximum working pressure

Model	Maximum full scale (N2 standard)	Minimum full scale (N2 standard)	Maximum working pressure
FAC-300	30 slm	10 sccm	750Psi/ 50 Bar

Note: SCCM (standard milliliters per minute) SLM (standard liters per minute) standard conditions (20°C, 101.3Kpa)

4.2、Performance parameters

Flow Accuracy	±%1 F.S
Repeatability	±0.2% F.S
Control Range	1%~100% F.S
Response Time	<2s
Temperature Coefficient	Zero: <0.05% of F.S./°C. Span: <0.1% of S.P. /°C
Pressure Coefficient	0.2% of S.P. / Bar
Operating Temperature	0~50°C
Leak Rate	1x10 ⁻⁹ atm. cc/sec He
Preheat Time	5 min accuracy to ±2% F.S (30 min to achieve the best accuracy)

4.3、Electrical parameters

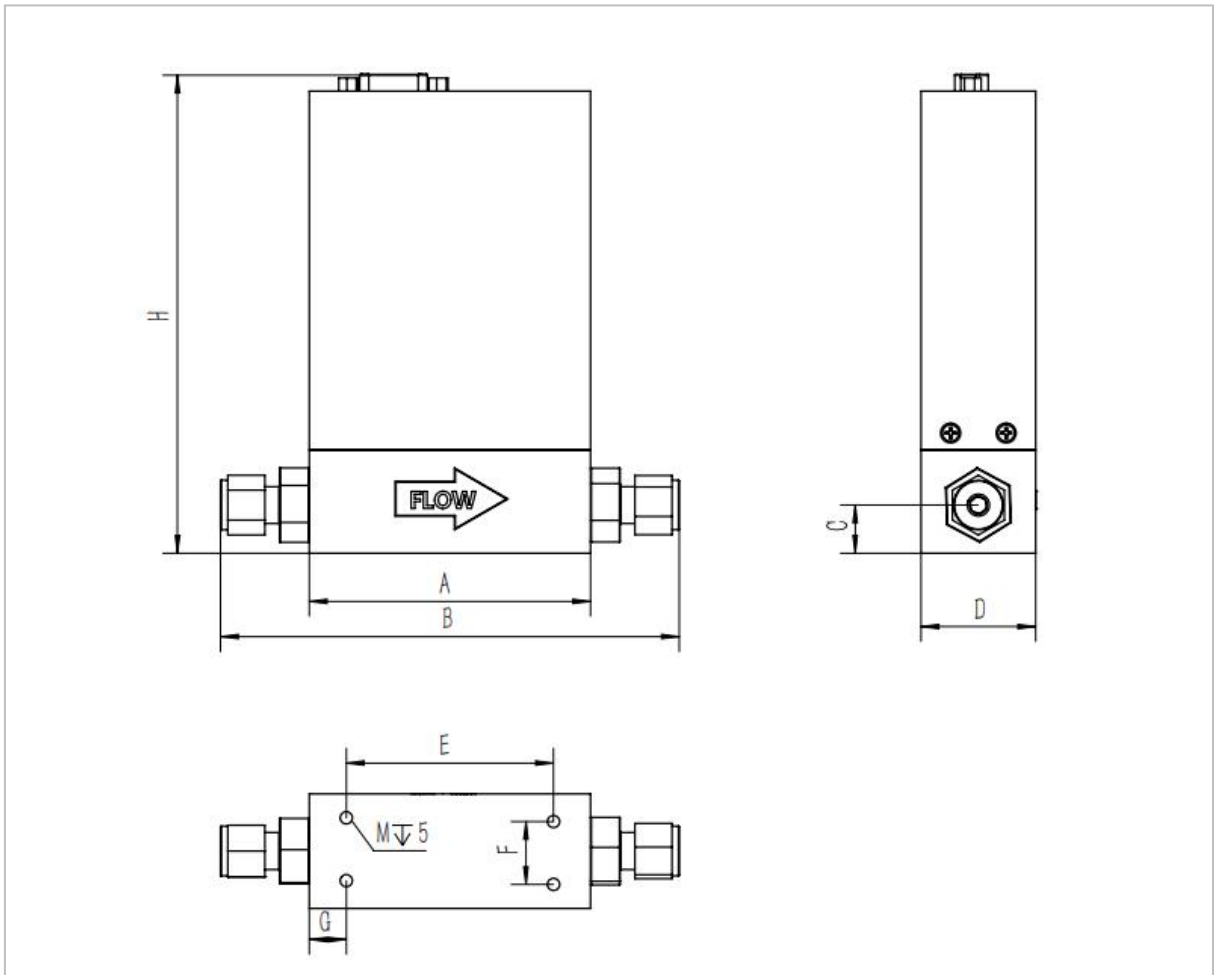
Power Supply	+15~24 V dc
Maximum Power Consumption	10W (MFC) ; 3W (MFM)
Analog Communication	0~5 V / 4~20mA
Electrical Interface	9-pin D-connector (male)

4.4. Mechanical parameters

Valve Type	Normally closed (MFM meaningless)
Substrate Material	316L stainless steel
Sealing Material	FKM, EPDM, BUNA
Process connections	Tube/VCR Fittings

4.5. Size (mm) and weight (kg)

FAC-300

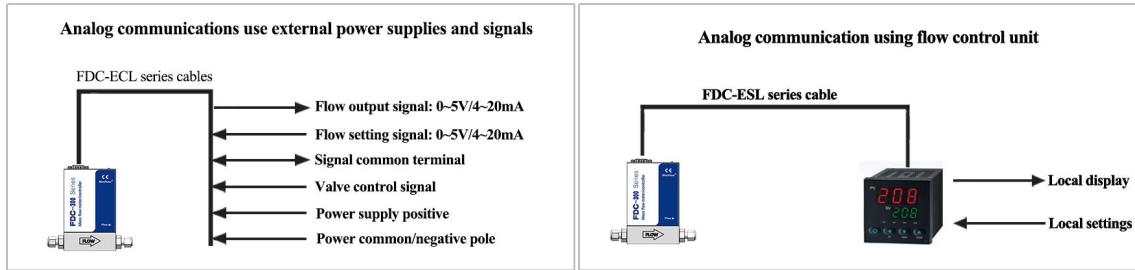


Model size & weight correspondence table

Model	A	B	C	D	H	E	F	G	M	Weight
FAC-300	76	124	13	31	125	56	17	10	M4	0.6

5、Electrical connections

Analog communication



DB9 analog communication electrical connection pin correspondence table

Pin number	Signal name
1	Chassis ground
2	Power supply positive[15~24V DC]
4	Input and output signal common terminal
5	Valve control (connected to positive power: cleaning; not connected or connected to negative power: normal control)
6	Flow feedback signal output
7	Negative power supply (power common terminal)
8	Flow setting signal input

Note: DB9 Male connector, other pins are not connected.

6、Install and use

6.1、Installation direction

The product can be installed at any angle and is calibrated horizontally by factory default. If the actual installation position is inconsistent with the calibrated position of the product when it leaves the factory, the product may have a zero point offset. In this case, the zero point can be adjusted before working. The air flow direction is marked with an arrow on the product and is correctly connected to the pipeline.

6.2、Note on usage

▲ Since the MFC valve is a regulating valve with a high leakage rate, it cannot be used as a stop valve. Users need to equip an additional stop valve.

▲ The gas used must be dry, clean, and pollution-free, and a filter must be installed if necessary.

▲ If gases that are easy to liquefy or crystallize are used, a one-way valve should be installed at the MFC outlet to prevent backflow from damaging the equipment.

7、 Function operation

7.1、 Peripheral description

▲ Button ZERO: Zero the device.

▲ LED light-MODE: Green light flashes slowly - the control signal is normal; green light stays on - the control signal is invalid.

▲ LED light-STATE: blue light is always on - normal control; red light flashes - abnormal status.

7.2、 Equipment zeroing

▲ Before performing equipment zero adjustment, the residual gas inside the MFC must be evacuated to ensure that there is no gas leakage.

▲ Fully preheat for 15 ~ 30 minutes.

▲ Press and hold the ZERO button for about 3 seconds, wait until the STATE light flashes red at a high frequency and release it. When the flashing ends, the zero adjustment is completed.

7.4、 NET-LED light status description

LED light shows status	Status description
STATE-red flashing at high frequency	Performing device zeroing
STATE-red flashing 1T/s	Sensor abnormality/valve leakage
STATE-red flashing 2T/s	Abnormal air source
STATE-red flashing 3T/s	Abnormal power supply voltage

8、 Troubleshooting

8.1、 The device has no gas output and the feedback signal is zero.

- ▲ The air source or airflow direction is incorrect;
- ▲ The control signal mode is inconsistent with the use signal;
- ▲ Incorrect electrical connections for power or setup signals;
- ▲ Zero point deviation;
- ▲ The circuit board or sensor failure;

8.2、 The setting signal is inconsistent with the feedback signal

- ▲ The use pressure is too low;
- ▲ The setting signal is inconsistent with the actual input signal;
- ▲ There is an error between the user output signal and the collected signal.

8.3、 No setting signal, feedback signal does not return to zero

- ▲ Zero point deviation;
- ▲ The valve is leaking.

8.4、 Output flow is inaccurate

- ▲ Zero point deviation;
- ▲ The standard temperature is inconsistent;
- ▲ The measuring range of the testing equipment is too large;
- ▲ Product failure.

9、 Product Guarantee and Service

9.1、 The warranty period for new products is one year after leaving the factory.

9.2、 The product warranty period after repair is 90 days.

9.3、 During the warranty period, repairs due to product quality problems are free of charge. Repair fees for products beyond the warranty period are charged according to the company's standards.

9.4、 If you use products with toxic and corrosive gases or other pollutants, please completely remove the residues and pollutants before repairing them, and inform the relevant personnel of the company.

9.5、 Product failure due to the following reasons is not covered by the warranty:

- ▲ Mechanical failure caused by product falling or external impact;
- ▲ Incorrect electrical connections lead to damage to internal electronic components;
- ▲ Degeneration of the sealing material caused by inconsistent parameters between the gas used and the equipment used;
- ▲ Damage caused by using gas pressure exceeding equipment parameters;
- ▲ The gas used is unclean, and particles or other pollutants may cause blockage of the internal precision components of the product;
- ▲ Use gas that is easy to crystallize and fail to purge it in time after use, causing gas crystallization to block the airflow channel;
- ▲ Unauthorized disassembly and modification of products without the permission of the company.

9.6、 The company provides product-related instructions and technical support free of charge.

10、 Disclaimer

The company is not responsible for losses caused by the following circumstances:

- ▲ Losses caused by natural disasters or other force majeure factors;
- ▲ The user failed to operate correctly according to the instructions in the manual;
- ▲ Unreasonable use by the user;
- ▲ Change the product structure or parts without authorization from the company.